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INHERITANCE BY MAGIC

BY A. L. KROEBER

MODERN science has done much to study and elucidate savage psychology and reasoning, folk-ways and mores, primitive methods of thought. This essay is written as an analysis of modern scientific tendency in the light of primitive and naïve thinking.

That the idea of evolution is an old one, far antedating Darwin, is a commonplace. But it is perhaps not yet generally recognized even by biologists how truly ancient and really widespread—in fact, almost universal in the history of human thought—the idea of cosmic evolution has been.

Among the untutored and isolated natives of Samoa, one version of the story of origins begins with fire and water, who married and from whom sprang the earth, rocks, trees, and everything. Then the cuttlefish—representative of a previous order of existence, in Polynesian mythology,—fought with the fire and was beaten. The fire fought with the rocks—its progeny—and the rocks conquered. The large rocks fought with the small stones; the small conquered. The small stones fought with the grass, and the grass won. The grass fought with the trees: it was beaten. The creepers fought with the trees and conquered. The creepers rotted, swarmed with maggots, and from maggots there grew to be men. The evolutionary idea is particularly apparent in its emphasis on the factors of competition and superseding.

Among the natives of Hawaii, in a long duration of primeval night, a progressive series of eight periods was recognized, in which there appear, or literally "are born," the following in order:

First, worms, corals, shells, seaweed, kelp, sedge, grass.
Second, insects and birds.
Third, trees, jellyfish, fishes, whales.
Fourth, turtles and cultivable plants.

Fifth, pigs and human arts.

Sixth, mice and porpoises.

Seventh, visions, sounds, thoughts, and sayings.

Eighth, man.

Even this skeleton indicates the mystic elements contained in the myth; but its scientific adumbration, at least as great as that of the book of Genesis, is also evident.

The Luiseño Indians of California tell that "the first that came or appeared" were Solitariness and Emptiness. Then Being and Existence found themselves there. Then Whitish Gray and Boring Lowering existed. Then Sky and Earth were born. From them were born in order these pairs: Hair and Cane, of ceremonial significance; Basket and Throwing Stick, also of ritualistic implications; Iron Oxide and Pond Scum, used as paint for religious purposes. Then follow Water and Mud; Rose and Blackberry; Tussock Grass and Sedge; Salt Grass; Blood and Menstruation. Then came forth the hills, trees, and stones. Then followed more births: Badger; Buzzard; Ball Lightning or Meteor, a spirit; the underground Water Monster; Ghost; Yellow Pine and Cottonwood, ceremonially symbolic; Booth and Votive Offerings, also ritual; Mountain Ash; Isla, a plant; Brake Fern. Next there occurred the births of the Black Rattlesnake, the Red Rattlesnake, the Spider, the Tarantula or Tarantula-Hawk, the Raven, the Bear, and the Sting Ray, all messengers and avengers of the principal spirit to whom ceremonies relate; and finally these ritualistic objects: the Winnowing Basket; the Mortar and Stone Bowl; a Fish and Urine. These beings,—animals, plants, and objects,—later became the first people of the human species, from whom modern tribes are descended. The religious and mythological imports predominate in this story also; but a quasi-scientific evolutionary scheme of the origins of the world and life is indisputable.

To whatever part of the earth we turn, similar inclinations are apparent. The pre-mediaeval Shinto mythology of Japan, the Greek cosmogony of Hesiod, the ruder and more fragmentary one of ancient Egypt, even the crudely specialized traditions of the Australian Blackfellows, all evince a more or less complete working out of the same thought. It underlies in a way the Hindu conception of transmigration, and has thus become a mental influence among the hundreds of millions to whom Buddhism has spread. The American Indians almost universally assume a former period when men were animals, or beings were undifferentiated between men and animals or objects; and the germ of the evolutionary idea is of course present in this assumption.

In the beginnings of western science, the early Greek philosophers unanimously took for granted a gradual development. Their search was for the substance that would result in the most plausible scheme of growth of things when postulated as primary and basic. They began with water, air, and fire; became less concrete with four elements; more immaterial still with the half abstract notions of mind, number, or being; and finally settled down to either the postulate of original ideas or original atoms. But the concept of natural unfolding, an inherent development, a "rolling out" of some sort, was rarely denied or wholly abandoned. The evolutionistic inclinations of Lucretius and his masters, random though they be, are well known; and the philosophical speculation and anticipatory scientific reasoning of the ancients, with particular reference to the development of the organic, in which they were far less interested than in that of the physical world and of man, have been thoroughly described and thoughtfully weighed by Osborn in his "From the Greeks to Darwin."

In fact, the human mind in thousands of years appears to have been able to make use of but two ideas in explaining to itself the origin of the world: that of evolution and that of creation, as it has lately been customary to name them. Both are obviously derived from analogies with concrete events which every human being witnesses constantly: the process of birth and growth, organic, and the process of making or manufacture as exemplified by human hands. Many nations have drawn on both acts in formulating their cosmogonies; some have partly obscured them by literary and ritualistic intertwinings; but in general the evolutionary idea of growth has perhaps equalled in strength that of creation. Only one people, the Jews, through their personalizing genius and anthropocentric bent, turned, for a time and over a part of this planet, the balance in the opposite direction. Even in their thought there are traces of the more usual concept: the association with animals in Eden; the speaking and four-footed serpent—half animal, half man; the order of events in creation, which, though it distinctly does not fit the conclusions of our astronomy, geology, and palaeontology, does show some attempts at a successive and progressive sequence. The ramification of Judaism into Christianity and Mohammedanism, and the vitality of the principles assumed by them in common, gave to the idea of creation a fifteen hundred years' prevalence in the western world, which, as it crystallized, lent to the point of view an appearance of permanent exclusiveness long after new forces had undermined it within. But so far as human civilization as a whole is concerned, the idea of evolution, in dim or definite form, has always maintained itself in some measure and often had the upper hand.

It was then inevitable that science should sooner or later make use of this concept, just as it appropriated to itself the essentially half mythological ideas of the atom and of ether. What Lamarck did a century ago was merely to connect this age-old unscientifically founded idea with the accumulating body of organized knowledge. What he did not do, was to try seriously to explain evolution by any accurately analyzed process.

That the evolutionary concept should be specifically applied to organic life was inevitable as soon as the manifestations of life began to be viewed with appreciable interest. As long as the world, like a child in a menagerie, was content to marvel at the forms and activities of life, and to be directly emotionally impressed by them, nothing resulted but art, literature, and mythology. When examination was undertaken, some scheme was bound to eventuate.

In the day of Lamarck, the impress of observation was still overpoweringly fresh. Observations had revealed an extraordinary degree of adaptation in animals and plants. While organs and actions were merely seen, these excited surprise countless times. When they were watched, a clear relation between form and use often became manifest at once, leading to the surmise that other as yet unexplained forms and uses might be similarly connected. The following out of such problems grew into a fascinating pursuit, particularly as every step involved an easy entry into entirely unexplored regions without a new method of procedure. It is no wonder, therefore, that the main effort of biologists of a hundred years ago was devoted to the exposition and following out of adaptations. The real interest was in these, and not in any explanation of how the forms of life came to be. Showing the function of a peculiarity of an organism still took precedence over showing how it actually originated or might have originated.

Of course, effort was not entirely confined to these recurrent revels. Lamarck certainly stressed the fact of evolution as much as possible. But what process was available to operate with? Heredity, naturally, was patent. That children usually resemble parents, that sheep bear lambs, and lions give birth to lions and not tigers, the rudest savage of thousands of years ago knew. But heredity, which maintains similarity and preserves, is in its nature opposed to the change inherent in evolution or development. It obviously gives order and fixity to the phenomena of life; it cannot in itself explain progress or alteration. Some other factor or force is required. What could this be? As always, analogy was first resorted to.

Everyone knows from his personal experience that practice makes perfect. Everyone knows that use strengthens and develops the blacksmith's arms, the musicians's fingers, the sailor's hands, the porter's back. This principle was applied. The animal that runs or butts or tears or swims, acquires or tends to acquire legs, horns, claws, or fins, irrespective of what it may have had before, just as one can see the blacksmith acquiring muscle, and the pianist spread and agility of fingers, from year to year. What can go on for ten years might go on for ten thousand, with a thousand times the effect.

And why not? No one knew anything to the contrary. No one had any ground for dispute, except from generic hostility of a theological or professional kind. As is well known, ninety-nine of every hundred educated civilized people today, with all their having the phrase "survival of the fittest" in their mouths, still believe, unless they have had exceptional training in biology, that evolution takes place in this way. It is no wonder that the pioneer Lamarck did the same.

Of course the inevitable weakness of analogy was present. The individual is not the race. What is true of one might or might not be true of the other.[1] But it is also inevitable that purely negative reasoning does not avail against positive. One gets nowhere with it. Not until a positive scheme able to replace the existing one was provided, was there the least chance, or the least profit, in harping on the fundamental weakness of the analogy that underlay the Lamarckian explanation of evolution. It is true that for half a century the Lamarckian principles were largely ignored or denied; but they were not critically assailed.

The new scheme was provided by Darwin, and it speaks for its positive value, and its usefulness, that the man on the street still thinks of Darwin not as the propounder of a new explanation of evolution, but as the discoverer of evolution itself.

Darwin left aside, as unnecessary for his evolutionary process, the ancient idea of use development. He kept, of course, as evolutionists always must, the other Lamarckian factor of heredity. He added to it two others which had not been made use of before: first, individual variability; and second, competition or the struggle for existence. The combination of these three elements gave him his process of natural selection,—of which the more widely known phrase, survival of the fittest, is nothing but a more picturesque synonym;—in short, the means by which organic evolution works.

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[1] That Lamarck did not hesitate at completely ignoring the difference between the organism and the race, and that in the most unconcerned manner, is clear from his statement of his two fundamental laws in their first form, in the *Philosophie Zoologique*, part one, chapter seven:—

"*Première Loi:*

"Dans tout animal qui n'a point depassé le terme de ses developpements, l'emploi plus frequent et soutenu d'un organe quelconque, fortifie peu a peu cet organe, le développe, l'aggrandit, et lui donne une puissance proportionnée à la durée de cet emploi; tandis que le défaut constant d'usage de tel organe, l'affaiblit insensiblement, le détériore, diminue progressivement ses facultés, et finit par le faire disparaitre.

"*Deuxième Loi:*

"Tout ce que la nature a fait acquérir ou perdre aux individus par l'influence des circonstances ǒu leur race se trouve depuis longtemps exposée, et par conséquent par l'influence de l'emploi predominant de tel organe, ou par celle d'un défaut constant d'usage de telle partie, elle le conserve par la génération aux nouveaux individus qui en proviennent, pourvu que les changements acquis soient communs aux deux sexes, ou à ceux qui ont produit ces nouveaux individus."

Darwin's achievement consisted in his combination of his three factors into a process. The strength of his position lay in the indisputability of his three factors. Heredity had always been accepted. Variability, though apparently contradictory of heredity, and although still unexplained as to its origins, was equally universal and undeniable. And that competition does and must take place on an enormously important scale, is equally plain. Hence the Darwinian explanation, once the relation of the three factors was made, was unassailable. We can limit the applicability of the explanation; we can find cases which it can be made to fit only with difficulty; we can, and probably shall, find other processes which are also operative; but the world must probably forever believe that natural selection is of some influence in the shaping of life. And Darwin from the whole bent of his mind was not trying to give a history of life, which would unquestionably have been attacked and destroyed at multitudinous points, but to demonstrate the applicability to this history of a universal formula.

Hence it is not remarkable that Darwin, while not seriously employing the older pseudo-process of Lamarck, refused to break with it. With all his originality he was essentially sane with the conservatism of balance; he was producing, not clearing; and the older explanation was not in his way. There was room for both. Darwin's work was to make evolution tangible by proving natural selection. He would have left his course by trying to disprove use inheritance.

At the same time, the world could not always occupy his aloof position. When the fight was over and the principle of selection accepted, the house of science had to be put in order. Two diverse explanations, with nothing in common but the assumption of heredity, were in each other's way. They left an uncertainty which either alone did not produce; and they were bound to irritate as everything which confuses irritates. The next generation was called to choose between them. Selection, although the full extent of its applicability may be undemonstrable, was certain. It was also new. The older explanation of use inheritance was therefore due for a hostile examination. The only surprise now is that the attack was so long deferred.

It was Weismann who led the onslaught. The destructive nature of his achievement, a stiffness in constructive theorizing, to which he felt impelled, but which resulted only in barren formalities, have led to an undue disrespect for his name which is perhaps strongest among his biological colleagues who can appreciate his technical shortcomings. Without the greatness of Darwin, and an extremist, he was however on fundamentals as clear a thinker as Darwin; and his accomplishment will in the end be rated in proportion. He was the first to take a step that had to be taken.

At the very touch, the Lamarckian structure proved to be absolutely hollow. Experiment failed to produce even a scrap of positive evidence in its favor. Renewed examination demonstrated that there was not a single alleged instance which was more than logically possible. Practically every case of use inheritance was explicable by selection. The case for it came down to the condition so graphically depicted by Ball: "Are we to conclude that use inheritance *plus* selection will modify races, just as Voltaire firmly held that incantations, together with sufficient arsenic, would destroy flocks of sheep?"

Weismann died since the preceding pages were first written. What has been the effect of his career? Superficially, very little. To the world at large he is a second magnitude, a disputative follower of Darwin and opponent of Spencer without the popularizing ability or fame of Huxley and Haeckel. To biologists he is an ultra positivist, who argued with clearness one side of a question which they have grown tired of, and otherwise built up certain theories which scientific manners at times require to be mentioned, but which are singularly thin, unplausible, and barren. And yet his basic idea, that the hereditary substance is totally distinct from the organic body, and that therefore the fate of the individual cannot affect the race, has found the strongest corroboration in a new branch of biological science whose origin has no connection whatever with the current of thought of which Weismann formed part. If Mendelism rests on anything at all, it rests on the doctrine of the utter separateness of what it calls gamete and zygote. This separateness may be purely conceptual, but it is the only concept which it has yet been possible for anyone to think out that will explain and hold together the looming mass of facts heaped up by genetic observation and experiment. There is an impression among some Mendelists that the greatest accomplishment of their science has been the superseding of Darwinism. With Darwin the ultra-Darwinian Weismann of course would fall too; and this school may not relish any one's believing that one of their fundamental achievements has been the involuntary confirmation by real knowledge of an idea first clearly grasped by a Darwinian theorist. But if the principle of the distinctness of germ and body is basic to Mendelism, it is basic also to Weismannism; and to this extent the newer science has vindicated Weismann.

There was a time not so long ago when many sensible people still thought it desirable to try to prove that the findings of geology and biology were reconcilable with the view that this earth had its beginning in 4004 B.C. At present it is no longer considered profitable even for intelligent clergymen to make this attempt. In fact the best form demands a downright admission, or at most a more or less dignified evasion. What has brought about this change? Certainly not argument. In countries where education prevails, the majority has gone over; and the majority of professional ministers of religion to the educated have had to go over with them. The question in fact is not arguable any more. Whoever wishes to stay with the belated minority, is at liberty to do so; and there is the end to it. No person of understanding with anything else to do will argue the point, because it is plain that whoever believes in the literalness of the Old Testament does so because he wants to and not because the preponderance of evidence forces him that way. On the other hand, once anyone has this predilection, it is childishly easy for him to find arguments in favor of his case, and to emphasize that the evidence against him is not absolutely complete—as of course it never is against anything. Therefore the recognition that discussion of the subject is no longer fruitful.

It is much the same with the "problem" of use inheritance or acquired heredity, so far as profit is concerned. Whoever falls back on the evidence and the possible ways it may be interpreted, can chase his tail around till doomsday. Many biologists now realize this and refuse very carefully to be drawn into any discussion of the subject. But their motive is different from the reason that keeps them from letting themselves be troubled by the claims of 4004. That is a plain superseded superstition; but acquired heredity is not yet a superstition, it is only a tiresome noise which is taboo in much really high scientific society: just as many perennial social problems are taboo in good social circles not because they are antiquated but because they are disagreeable.

The result is that instead of heredity by acquirement being actively frowned upon and stamped out as a pernicious heresy, it is evaded; and the consequence of this convenient shutting of the eyes is that whenever a biologist is mentally youthful, or temperamentally belated, or over-conscientious, or inefficient from over-catholicity, or just plainly muddleheaded, he always sooner or later innocently and earnestly discovers this undisposed of mass of refuse that everybody else has been throwing out of the back window in order to keep the living room clean; and he runs serious risk of endeavoring to haul it back again in the belief that it is or contains something valuable. Of course he gets more shrugs of the shoulder than enthusiastic visitors. But the reason of the disapproval accorded him is not the entirely good one that the mess he is dragging back in is so dangerously unhealthy that it ought to be buried or burned once for all, but the very bad one that it smells so stale that no one wants to come near it.

In short, the attitude of biologists in general on this problem of acquired heredity is far from satisfyingly vigorous, and when they avoid its further discussion it is not because the problem is settled but precisely because it is unsettled and long unsettled. Scarcely anywhere since Weismann is there any zeal against the doctrine of acquired heredity as something radically and vitally and destructively wrong. Biology has plenty of fires lit for the unbeliever in some of its principles, as witness the eugenics propaganda; but it scarcely professes a cardinal article of faith on acquired heredity. What brings it about that there exist so much weak condemnation, half tolerance, and hankering?

There are two reasons. The first is the unsolved explanation of the origin of variations. That variations constantly occur no one has denied. But how new variations come to be; how selection operates to preserve them for the future benefit of the race, while they are still so rudimentary as to be functionless and unserviceable; how, unless selection were practically unfailing as regards every individual, new slight variations could be maintained and increased in the face of free interbreeding; these were serious and justified questions that arose soon after the original Darwinian theory was launched. There is no doubt that if use inheritance existed, we should have a much simpler, more natural, and more convincing explanation of evolution, in many cases, than human ingenuity has yet been able to give with the principle of natural selection. Hence it is no wonder that the Lamarckian theory was revived twenty or thirty years after the publication of the "Origin of Species" by several eminent biologists who could not be accused of old-fashioned orthodox hostility to the Darwinian doctrine, but who realized its limitations. It is also of note that these men were in the main not dealers in general speculation, but close students of palaeontology or some other branch of the history of life; and that they were driven to their stand by the difficulty of understanding, in terms of natural selection alone, actual phenomena before them, and not by original preference for any other theory. The conviction of these students is summarized in a clear statement of the situation made long ago by Professor Osborn: "Upon Weismann's principle we can explain Inheritance, but not Evolution, while with Lamarck's principle and Darwin's Selection principle we can explain Evolution, but not, at present, Inheritance. Disprove Lamarck's principle, and we must assume that there is some third factor in Evolution of which we are now ignorant."

This, incidentally, is as true today as it was twenty-five years ago; and it is our continued ignorance of this third factor that still drives some true thinkers into adhesion to the Lamarckian principle as the only available substitute.

More recently the extraordinary discoveries in Mendelian heredity have again made clear that the origin of variations or mutations is an utterly unanswered question, and far from being so simple and self-assumable a thing as it seemed to Darwin and the early Darwinists, that it is a most vital problem of bearing on all evolutionary views. But this is a new conviction; the frequent tolerance toward acquired heredity is older; and even if the Mendelist falls back on use inheritance, it furnishes him, to date, only with a possible key and not a certain one, since the absolute distinction between gamete and zygote which is the kernel and essence of all the new unit heredity seems contradictory of any possible understanding of use inheritance as a process, and leaves it an empty name.

Hence the explanation that might be given, that biology is often indifferent and occasionally even friendly to the unverified and challenged theory of acquired heredity, because the science is unable to discover any other way of accounting for mutations, is mainly a technical explanation, and therefore not a valid one.

For that matter, the average man, educated or uneducated, is firmly convinced of acquired heredity and neither knows what mutations are nor bothers his head about the cause of variability. Now when the leaders of thought and the mass of men agree on a new doctrine, such as perhaps eugenics, it is pretty plain that the mass is following the leaders; but when the doctrine is age-old and therefore necessarily rooted in common ignorance, it is equally plain that the leaders are still traveling with the mass because they have not separated themselves from it; and we can therefore deny them the claim, on the particular point in question, of possessing the wisdom of the elect. At best, they are only falling back upon semi-superstition in default of anything better.

A second reason, then, and not the foregoing explanation, is the general cause of the biological reluctance against a final and definite divorce from the assumption of acquired heredity. It is this.

There is another evolution, distinct from the evolution of organic life, in which use modification is permanent and transmittal of the acquired exists. These two evolutions, although dissimilar in their material and unconnected in process, are analogous enough in their results to have remained undistinguished in the less discriminating days of the past. They are still not separated in the public mind, which always in its bulk is the mind of former periods. And while biologists in general may formally admit the duality of the processes, the controlling majority of them, at least, have not yet made the distinction an active enough part of their mental equipment to put it to consistent use.

This other non-organic process of evolution is that of civilization, of human accomplishment. Speech, knowledge, arts, learning, and all our activities except the bare substratum of physiological abilities, are not inborn. Heredity gives us the slate and the pencil in good working order. Our individual kinds of slates and the sharpness of the pencils are also wholly from heredity. But with the writing on the slate, which is the part we play in civilization, heredity has nothing to do. That comes from social situation, in other words the existing civilization into which we are born.

Now organic evolution, which cannot work except through heredity, is not an accumulative process. The recapitulation of past descent in the early stages of individual existence is so tremendously abbreviated and condensed as to be unimportant even to the individual. Nor does this recapitulation increase and become more consequential with the progress of organic evolution. On the other hand, social evolution is not only essentially but absolutely an accumulative process. We write the Roman alphabet not because we are born with the ability or because our parents were born with it, but because the art is given to us by them as it was given to them by their predecessors, who in turn based their knowledge upon the accomplishment of nations that wrote consonantally or syllabically, while back of that presumably lies word writing, then idea writing, then picture writing, then plain pictures.

Accumulation is not always the most conspicuous trait of the process of civilizational evolution; because the accumulation is often so slow as to be imperceptible except to the historian, or sometimes so remote as to have been forgotten. Such is the case with human speech. But even in such instances there are other criteria that mark the products of this evolution off from those due to organic evolution. Our speech is not instinctive like the bark of the dog or the song of the birds, but learned. It comes to us from the outside, that of animals from within. We acquire our so-called mother tongue as readily and as perfectly from a foster mother as from the zygote that produced one of the two gametes that made us; the non-human animal derives and can derive its language only from the zygote of which it is a bud or from the two zygotes of which its originating gametes are sprung. All that our actual parents give us is the faculty of speaking. The words, the idioms, the grammatical processes, the associated ideas, we derive from them not as parents but as members of a social group of which they happen to form a usual but perfectly accidental part.

As this social group develops anything new in its civilization or acquires any modification of its social activities, we and our successors acquire it too. Use inheritance is therefore strictly true of social evolution. It is precisely the method by which this evolution takes place.

It is also a fact that organic and social evolution evince a number of surprising analogies. The growth of life, both in the whole and in the individual, is remarkably similar in superficial appearance to the growth of civilization. But it is obvious that the processes by which these two growths take place are fundamentally different, unconnected, and even in a sense opposite.

Now every biologist and every sociologist knows this distinction. But even great biologists and great sociologists have forgotten it. Lesser ones forget it daily even now. And the unprofessional public, except in cases of rare native sense or profound mother-wit, does not of course even know that there is a difference. As little did former ages realize that the process mattered. To them, too largely, whatever was transmitted from the past was inherited. The very word which we still use to express the process of organic transmission, "heredity," refers originally to social transmission.

"Haeres" is an heir—a nephew or a father as the case may be, as readily as a son. Biologically we do not inherit from uncles or sons; and the use of the term heredity to denote organic inheritance could have taken place only in a time when the difference between this process and that of social inheritance was veiled by the outward similarity of their effects, and when its significance was not yet perceived and made use of.

Everyone knows that a million dollars however lawfully inherited are not a unit character. Even a layman will admit that we do not inherit a coat of tan from a grandfather. But on the other hand, when the conditions are sufficiently stretched to be tenuous and vague, when the elements of knowledge become vanishingly small in the haze of unavowed ignorance, even scientists revert to naïve methods of thought, and cheerfully assume or gravely argue that a fair race will turn black from tropical exposure of continued generations, and that the acquisition of greater wealth or learning or skill by one group is evidence of a superior faculty for such acquisition inborn in that group through organic heredity. In the whole matter of difference between nations, castes, or social groups, biologists as a class are still amazingly primitive mentally. Instead of inquiring whether there is any relation whatsoever between these social groups and the organic species and races with which they themselves are wont to deal, they take identity for granted and then proceed to explain phenomena of social evolution by processes of organic development.

Historians have not been quite so crude: but they deserve no credit for the fact. The reason is not that they have discriminated more clearly, but that history is older than biology. Man's interest is first in himself, only secondly in nature. Hence in ancient times and in half-civilized forms of society it is rather organic phenomena that are explained by social processes when they are explained at all; and the historians of the past, perhaps, have lapsed into fewer errors than biologists, not because they understood man better but because they were not at all interested in the animal.

The modern historian is sometimes still as innocent as his predecessors, though fashion requires him to appear more learned.

But the sociologist of today has an avowed goal, and must make himself a program; and only too frequently a lack of imagination leaves him no resource but to pick up the tools of the biologist and set to work blindly. It is true that one profession contains no more ability and no more incompetence than another. But as times progress, the chances of achievement, or the opportunities for error, alter.

Biologists have such a fatal opportunity now; and many of them have stepped into the trap. History, except in what it professes, is very much where it stood two thousand years ago. But biology has been born in the last century or two. It has forged its weapons, taught itself their use, conquered a territory, and stands forth a young giant of prowess. What wonder that it has proceeded by the divine right of power to annex the antiquated realm of history that lay adjacent, and to impose its rule and laws without inquiring whether they were fit? The greater fault is not with the biologists who have explained historical phenomena by organic processes, but with the sociologists who have accepted and welcomed these alien explanations.

The degree to which biologists and those infected with biological methods of thought deceive themselves into believing that they are resolving social phenomena into organic factors is truly astounding. In the matter of the facultative equivalence or identity of the human races, as already mentioned, the average biologist assumes his answer, instead of defining his problem, as blithely as an ignorant person. Some write with confident optimism on the biological status *and* social worth of hybrid races, and no voice is raised. But let a historian, or theologian, or any one else discuss in one breath the infallibility and the specific gravity of the Pope, and he will be set down as literally insane.

The entire doctrine of eugenics is an endeavor to attain moral ends by biological means. Moral of course is social; and yet the open protests have come—strange partnership!—from the orthodoxly religious and the professedly skeptical, but rarely from the enlightened camp of science. Not the educated thinker but the uninformed man on the street raises the valid objection—and it is not only valid but perhaps the only one that counts,—that eugenics is right enough for hogs but not for men. We have, indeed, come almost to the point where the learned try to forget, and only ignoramuses remember, that while men are animals, animals are not men, and that however much a human being may have of the nature of the pig, he nevertheless has one thing that no pig ever had, namely the faculty for civilization and hence for morality, to use an ancient term.

Darwin a number of times cites traits or habits of savages as if they might be indicative of transitions between civilized man and the other higher animals. Such confusion of perception as he may be guilty of, is however not seriously material. Darwin was an explainer of the organic, and avowedly not a historian of the social. If in buttressing his views he was occasionally deceived by an analogy and adduced as argument an instance that neither rests upon heredity nor has anything to do with the evolution of life, such slips do not weaken his case nor detract from his fame, especially as his utterances on such points are regularly tempered by a wise restraint of statement.

It is another and more vital failure, when we of today, biologists, sociologists, anthropologists, and sometimes historians, with fifty years of advantage over Darwin, we to whom organic evolution is no longer an ideal doctrine to be justified to the world but a foundation from which we are building, are guilty, often in an exaggerated degree, of the inability to discriminate the two forces involved. There is nothing that reveals more illuminatingly the intrinsic greatness of Darwin's mind than a comparison between his infrequent inclinations to lapse in using a social fact to drive home an argument for organic evolution—lapses in which moreover he almost always leaves the door open to a truer judgment,—and between the thin, meaningless edifices of empty theory that it is the fashion today to rear in mistaken imitation of the master and under the misleading name of "explanations" of "social evolution."

Such attempts as these may be pardoned when they come from orthodox Socialists whose aim is not truth but political propaganda. But it is difficult to accept with tolerance the numerous professedly scientific books that disguisedly or openly rest upon the fallacy that the social is organic. Restraint of expression against this flood is difficult, particularly since from the very beginning there have been voices of warning, notably from the codiscoverer of the doctrine of natural selection.

Wallace in his later years lost much of his credit in scientific quarters by his undiluted espousal of spiritualism, phrenology, and other dishonored causes. It may also be doubtful whether his assertion that the organic factor of selection does not apply to man as it does to animals, was due in greater measure to an actually keener perception of the difference of the social from the organic than Darwin possessed, or merely to greater inclination toward orthodox theological separation of the human soul from the living body. But whatever the impelling motive, he made the distinction; his name carried weight; and subsequent heedlessness is therefore without justification.

The profoundly imaginative nature of Galton was less preserved toward balance on this point than the temperament of his cousin Darwin. In "Hereditary Genius" Galton shows that as between individuals mental faculties are inherited in the same ratio and degree, and therefore presumably in the same manner, as physical traits, which is reasonable as well as convincing. But it is an entirely uncompelling inference when he then proceeds to explain the diversity between the attainments of social groups such as ancient Athenians, modern Englishmen, Africans, and Australian natives, as due to differences between the average inherited faculties of the bodies of men carrying the civilizations of these social groups. He is still less convincing when he expresses these differences quantitatively—only every twelfth Britisher, four hundredth negro, or four thousandth Blackfellow attaining to the inborn mentality of the every day normal Athenian of the time of Pericles. It is inference of the same sort that leads him to the conclusion that on the scale upon which the Athenian surpasses the Australian by five intervals, the dog, in memory and power of reason, stands below the human race by eleven intervals, and apparently below the Australian by only eight. Of the same type is the reasoning which ascribes the alleged poverty of Mediaeval civilization—entirely overlooking its great accomplishments, by the way,—to the distinctively selecting influence of the celibacy practised by many of its best minds. Such views are utterly untenable except on the preconception that social forces as such do not exist and that social phenomena are all ultimately, and in general directly, resolvable into organic factors. What other psychology than this can we attribute to Galton when he makes the astounding statement that in his belief the rapid rise of new colonies and the decay of old civilizations is mainly due to their respective social agencies, which in the one case promote, and in the other retard, the marriages of the most suitable breeds? In other words, social agencies may be nominally admitted, but they affect society through their organic operations!

With Galton descending into these crudities, it is no wonder that many lesser men have sinned as deeply, though their more pallid intellects have vaguened the fault.

Weismann's hostility to the belief in heredity of the acquired might be expected to have led him intuitively to an unusual power of discrimination of the organic from the social. This is a fact. His essay on the Musical Sense, for instance, is a startingly keen and sound analysis of the difference between heredity and tradition, between faculty and achievement. He realizes fully that a Mozart could not have done Mozart's work in another social environment, such as that of the Australian Blackfellows, and his realization is supported by authentic reasons. Up to this point no more rigid adherence to true sociological method could be asked of a pure historian. But at the very end of the essay, when one expects the final logical step and the pronouncement that the Australians undoubtedly may have had their Mozarts, in short that life and its processes are one thing and civilization and its agencies another, the force of association asserts itself, the professional evolutionary biologist reappears, and the argument is lamely hastened to the inconsequent conclusion that faculties are probably different after all. The work remains a brilliant miss, splendid in its display of the rigorous clearness which was Weismann's basic strength; but it is a miss nevertheless.

It must once more be asserted unconditionally that it is not to be inferred from these examples that biologists are any worse reasoners than students in other departments of knowledge. Chemists do not feel impelled to expound the rise of genius in chemical terms or to explain the variety of moral codes by valences and atomic weights. They therefore leave civilization alone, or if they pronounce judgments in its field, do so avowedly as laymen. But biologists view the province of the social from their very doorsteps. They are dazzled by the remarkable parallelism of the growth of the social and the organic; and they have therefore normally been driven by ambitious enterprise, and often by a sense of duty as well, to invade the fertile and universally interesting realm of human history.

It would then appear that belief in acquired heredity is merely a result of the failure to distinguish between social and organic processes, and a remnant of the ruder vision of former times when heir meant both a descendant by reproduction and the inheritor of possessions. If heredity by acquisition is still taken seriously by many earnest students, it is not because the evidence compels them, but because they make evidence in behalf of what they want to believe, just as all men in all matters tend normally to believe what is most satisfying and then to find corroborative arguments. The theory of acquired heredity is at the present time almost as belated a survival as the popular doctrine of prenatal influence which maintains itself with similar vigor in the face of every scrap of unbiased evidence. Both are processes of thinking which if found in the minds of uncivilized people would be described as belief in sympathetic magic. When the peasant woman wraps a round hard stone in linen and then goes home and bakes pancakes in order that her cabbages may be firm, white, sound, and large-leaved, the resemblances of fact which she has in her attention are true enough. She only fails to inquire if there is any possibility of the involved processes of causality being also identical. When a child is born with a flame-shaped red birth mark a few months after the mother has witnessed a conflagration, the average European is correct enough in his observation of a similarity of the phenomena. Only he fails to inquire whether there is the least chance that there may be a mechanism through which one event can become the cause of the other. When the reasoner infected with biological ideas or the habit of over-hasty social generalizing sees in the growth and decay of a nation nothing but the multiplied life-cycle of an organism; or when he notes the parallelism between men accumulating the inventions of their antecessors, and species of animals in new circumstances adding new organs or faculties to their previous traits; the analogies his mind dwells on are undeniable. But when he asserts the same cause for both sets of phenomena, his explanation is uncritical and not far from supernatural. This is as true when he is a sociologist and accounts for phases of civilization by innate racial heredity or by the selection of imported malaria, as when he is a biologist and resolves organic evolution even partly into a process which is merely a made-over adaptation of the process of racial transmission.

When this point is once grasped, and the distinction between the forces of life and the forces of civilization is courageously adhered to, the eyes see a new world. There is no longer any problem of acquired heredity nor any possibility of a problem. To refute it becomes as wasteful, and as encouraging of superstition, as to argue scientifically about the sacredness of seven or the harmony of the spheres. Sensible and reverent people today bury their dead; they do not discuss whether the embalmed mummy may not after all maintain some kind of an existence. Least of all do they want it around the house, or even stowed away in the attic.

The great mass of biologists are absolutely right in refusing to consider any further the question of acquired heredity. It is only the motive for their refusal that can be challenged. Too often it is not that they have seen light, but that their spirit is weary.

The old tiresome problem then is insoluble because it is no problem. It is justified to refuse to consider it farther, and proper to disregard all alleged and tempting evidence in its favor, as all evidence springing from motive is discredited in advance.

Biology and history can join hands in alliance across the gulf that separates them. The students of life can even derive help and profit from the students of human achievement. They can learn from them what acquirement is and how it is transmitted. Once it is identified, they will expel this alien incubus upon their work. They will limit their authority to what they can naturally subdue and govern. They will rid their science, which in every aspect revolves either closely or remotely about heredity, of an essentially non-hereditary and even anti-hereditary factor, and will then be free to explain the organic basis of history by purely organic causes, leaving the explanation of history itself, so far as one may be possible, to the historical methods of historians. If biologists neglect to take this stand, scientists of the social will in the end revolt violently against their authority and attain their own separateness by force. Under a wise and natural segregation, not so much of extent as of method consistently upheld within the demarked scope, each study will work out its independent destiny justly and intelligently, until the future gives them new contacts and new bonds.

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